

What is claimed is:

1. A light pipe with side-light extraction by light pipe-surface alteration, comprising:
 - a) an optical light pipe with a plastic light-carrying portion covered with a fluoropolymer cladding; and
 - 5 b) a plurality of light-extraction devices spaced along an active section of the light pipe for emission of side light over only a range from about 2 to 270 degrees of the cross-sectional circumference of the light pipe in the active region;
 - c) the light-extraction devices having inlets passing through the cladding and optically contacting the plastic light-carrying portion.
- 10 2. The light pipe of Claim 1, wherein the light-carrying portion comprises acrylic polymer.
3. The light pipe of Claim 1, wherein the light-extraction devices comprise a plurality of optical elements spaced along the length of the light pipe and having inlets passing through the cladding and optically contacting the light-carrying portion.
4. The light pipe of Claim 3, wherein the range is between about 30 and 90 degrees.
- 15 5. The light pipe of Claim 3, wherein the light-carrying portion comprises acrylic polymer.
6. The light pipe of Claim 3, wherein the density of light-extraction devices increases sequentially along the length of the light pipe the further the distance along the light pipe from a light source.
7. The light pipe of Claim 3, wherein each device increases in cross sectional area from inlet to
20 outlet in such manner as to reduce the angle of light passing through the device.
8. The light pipe of Claim 7, wherein each optical element comprises an interior light-reflective surface for receiving light from the inlet and transmitting it to an outlet.
9. The light pipe of Claim 1, wherein the light-extraction devices comprise respective pieces of material with a refractive index at least as high as that of the light-carrying portion; the
25 pieces passing through the cladding and optically contacting the plastic light-carrying portion.
10. The light pipe of Claim 9, wherein the light-carrying portion comprises acrylic polymer.
11. The light pipe of Claim 9, wherein the pieces have a substantially flat, rectangular surface facing radially away from the light pipe

12. The light pipe of Claim 11, wherein side surfaces of the pieces adjoin the substantially flat surface substantially at a right angle.
13. The light pipe of Claim 12, wherein the substantially flat surface is substantially parallel to a longitudinal axis of the light pipe.
- 5 14. The light pipe of Claim 9, wherein the pieces are substantially cylindrical and have longitudinal axes substantially perpendicular to the longitudinal axes of the light pipe.
15. The light pipe of Claim 14, wherein the substantially cylindrical pieces have a substantially flat surface facing radially away from the light pipe and aligned substantially parallel to the longitudinal axis of the light pipe.
- 10 16. The light pipe of Claim 9, wherein the density of light-extraction devices increases sequentially along the length of the light pipe.
17. A light pipe with side-light extraction by light pipe-surface alteration, comprising:
 - a) an optical light pipe with an acrylic polymer light-carrying portion covered with a fluoropolymer cladding; and
 - 15 b) a plurality of light-extraction devices spaced along an active section of the light pipe for emission of side light over only a range less than about 180 degrees of the cross-sectional circumference of the light pipe in the side light region;
 - c) the light-extraction devices comprising a plurality of optical elements spaced along the length of the light pipe and having inlets passing through the cladding and optically contacting the plastic light-carrying portion; and
 - 20 d) the light-extraction devices being spaced along the length of the light pipe with a density that increases sequentially along the length of the light pipe the further the distance along the light pipe from a light source.
18. The light pipe of Claim 17, wherein the range is no more than about 45 degrees.
- 25 19. The light pipe of Claim 18, wherein the range is no less than about 30 degrees.
20. The light pipe of Claim 17, wherein the diameter of the light-carrying portion is between about 6 mm and 25 mm.
21. The light pipe of Claim 17, wherein each device increases in cross sectional area from inlet to outlet in such manner as to reduce the angle of light passing through the device.

22. The light pipe of Claim 21, wherein each optical element comprises an interior light-reflective surface for receiving light from the inlet and transmitting it to an outlet.

23. A light pipe with side-light extraction by light pipe-surface alteration, comprising:

5 a) an optical light pipe with an acrylic polymer light-carrying portion covered with a fluoropolymer cladding; and

b) a plurality of light-extraction devices spaced along an active section of the light pipe for emission of side light over only a range less than about 180 degrees of the cross-sectional circumference of the light pipe in the side light region;

10 c) the light-extraction devices comprising respective pieces of material with a refractive index at least as high as that of the plastic light-carrying portion; the pieces passing through the cladding and optically contacting the plastic light-carrying portion; and

d) the light-extraction devices being spaced along the length of the light pipe with a density that increases sequentially along the length of the light pipe the further the distance along the light pipe from a light source.

15 24. The light pipe of Claim 23, wherein the range is no more than about 45 degrees.

25. The light pipe of Claim 24, wherein the range is more than about 30 degrees.

26. The light pipe of Claim 23, wherein the diameter of the light-carrying portion is between about 6 and 25 mm.

20 27. The light pipe of Claim 23, wherein the pieces have a substantially flat, rectangular surface facing radially away from the light pipe

28. The light pipe of Claim 27, wherein side surfaces of the pieces adjoin the substantially flat surface substantially at a right angle.

29. The light pipe of Claim 28, wherein the substantially flat surface is substantially parallel to a longitudinal axis of the light pipe.

25 30. The light pipe of Claim 23, wherein the pieces are substantially cylindrical and have longitudinal axes substantially perpendicular to the longitudinal axes of the light pipe.

31. The light pipe of Claim 30, wherein the substantially cylindrical pieces have a substantially flat surface facing radially away from the light pipe and aligned substantially parallel to the longitudinal axis of the light pipe.

30 32. A light pipe with side-light extraction by light pipe-surface alteration, comprising:

- a) an optical light pipe with a plastic light-carrying portion; and
 - b) an active section of the light pipe for side light emission comprising an axisymmetrical change of area of cross section of the light pipe that generally diminishes from an inlet end of the active section, through the active section;
- 5 c) the change of area of cross section comprising at least one downwardly tapered region.
33. The light pipe of Claim 32, wherein at least one tapered region is coated with a material to hinder light emission.
34. The light pipe of Claim 32, wherein at least one tapered region is coated with a material to help light emission.
- 10 35. The light pipe of Claim 32, wherein the change of area of cross section comprises a plurality of downwardly tapered regions separating regions of constant diameter.
36. The light pipe of Claim 35, wherein the tapered regions have uniform tapers.
37. The light pipe of Claim 35, wherein the tapered regions have a smooth configuration, lacking discontinuities.
- 15 38. The light pipe of Claim 37, wherein the tapered regions have non-linear tapers.
39. The light pipe of Claim 38, wherein at least one taper is increasingly smaller in cross section, the further the distance along the light pipe from a light source.